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California Late Miocene Records of *Swiftopecten* Hertlein, 1935

(Pelecypoda : Pectinidae)

BY

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(Plate 47)

Until recently (Stanton, 1966), the lowest recorded West Coast occurrences of species of the pectinid genus *Swiftopecten* Hertlein, 1935, were from Middle to Upper Pliocene strata (Anderson, 1905; Arnold, 1906; Nomland, 1917; Dall, 1898, 1907). In fact, the genus was generally regarded as an index to the Pliocene (Vedder, 1960, p. B 327).

As a result of detailed collecting in the Castaic Formation (Late Miocene) of Los Angeles County, California, Stanton (1966, p 27) discovered the oldest record of the genus, thus lowering the known range to the Late Miocene. Recently, while undertaking a detailed biostratigraphic study of the Neogene Formations of the Coalinga Region, California, the writer collected one almost complete specimen (Plate 47, Figures 1 and 2) and a fragment of the hinge area of another specimen belonging to this genus from the Late Miocene Santa Margarita Formation (Univ. Calif. Mus. Paleo. locality D-1088), exposed on Coalinga Anticline, about 9 miles north of Coalinga, California. These records unequivocally show that the genus *Swiftopecten* was already established along the Eastern Pacific during Late Miocene times.

The genus *Swiftopecten* probably evolved in the Western Pacific. The probable ancestral form, *Nanaochlamys kitamurai* (Kotaka, 1955) (see Masuda, 1962, p. 128) was common in Japan in beds as old as Late Oligocene. Younger forms representing successive stages of evolution, such as *Nanaochlamys notoensis* (Yokoyama, 1929) and *N. notoensis otutumiensis* (Nomura & Hatai, 1937) (Masuda, *loc. cit.*) also ranged to Middle or Late Miocene. The oldest Japanese record of the type species, *Swiftopecten swiftii* (Bernardi, 1858) (the single survivor of the genus) is Middle Miocene (Masuda, 1959; 1962, p. 196; Uozumi, Fujie & Matsui, 1966). It, therefore, appears reasonable to assume that the western North American representatives of the genus were derived from Miocene immigrants from the Western Pacific.

Stanton (1966, *loc. cit.*) collected two fragmentary specimens from the Castaic Formation (Calif. Inst. of Tech. locality 1663). These were medium-sized, thin-shelled individuals, about 50 mm high. The sculpture, which was reflected internally, consisted of a few low, broad ribs and furrows on which other smaller, finer riblets were superposed. About 3 riblets were present on

each major rib and 4 in each furrow. The flattish topped ribs were much wider than the intervening furrows, and there were no prominent constrictions on the shells. Though STANTON (*loc. cit.*) referred his specimens to *Chlamys parmeleei* (DALL, 1898) (a species commonly considered diagnostic of the Pliocene of Southern California; see VEDDER, 1960, *loc. cit.*), he noted that the sculpture differed from that of the type of DALL's species, but more closely resembled that of a specimen from the Pliocene of Crescent City, California, referred to DALL's species and figured by ARNOLD (1906, pl. 41, fig. 5). There is probably no doubt that the affinities of the Castaic specimens were with the Southern California species, *Swiftopecten parmeleei* (DALL).

The specimens collected by the writer from the Santa Margarita Formation of the Coalinga region (Figures 1 and 2) were unlike any previously described northeastern Pacific species. They were medium-sized, thin-walled and sub-circular; they were ornamented by 5 very prominent but narrow major ribs between which were other minor ribs of about the same width as the 5 major ribs. Two minor ribs were present in the interspaces between adjacent major ribs. Between, and superimposed on the major and minor ribs were numerous finer riblets. In addition, the almost complete valve (Figures 1 and 2) showed a few successive prominent constrictions. The characters of this species are somewhat reminiscent of those of some Japanese species referred to *Chlamys cosibensis* (YOKOYAMA, 1911) by MASUDA (1959, 1962) on the one hand, and those of *Swiftopecten wattsi* (ARNOLD, 1906) and *S. nutteri* (ARNOLD, 1906) from the California Middle and Late Pliocene on the other.

The following fossil species were collected from the same locality in the Santa Margarita Formation as the *Swiftopecten* spec.

PELECYPODA

Aequipecten raymondi (CLARK, 1915)
Diplodonta harfordi ANDERSON, 1905
Hinnites multirugosus crassiplicatus (GALE, 1928)
Lyropecten crassicardo (CONRAD, 1856)
L. crassicardo nomlandi (HERTLEIN, 1931)
L. estrellanus (CONRAD, 1856)
Macoma diabloensis CLARK, 1915
Mya (Arenomya) dickersoni CLARK, 1915
Ostrea titan titan CONRAD, 1857
O. titan eucorrugata HERTLEIN, 1934
Solen sp. indet.

GASTROPODA

Forreria carisaensis (ANDERSON, 1905)

CIRRIPEDIA

Balanus (Balanus) gregarius (CONRAD, 1856)

PISCES

Fish vertebrae

The present records show that two distinct species of *Swiftopecten* were already present in western North America during the late Miocene.

In the light of these recent discoveries, it would be necessary not only to review the evolution and the biogeography of the genus but also the relationship of the California Pliocene and ?Pleistocene species to the probable ancestral stocks from the Western Pacific.

It appears probable that MASUDA's (1962, p. 128) suggestion that the western North American "Pliocene" species *Swiftopecten parmeleei* (DALL, 1898) and *S. kindlei* (DALL, 1907) descended from *S. swiftii s. s.* may be oversimplified. The writer's contention is based on the facts that *Chlamys cosibensis* (YOKOYAMA, 1911) had no place in MASUDA's evolutionary scheme for *Swiftopecten*; and MASUDA failed to consider the Middle to Late Pliocene species *S. etchegoini* (ANDERSON, 1905), *S. wattsi* (ARNOLD, 1906), and *S. nutteri* (ARNOLD, 1906) from Middle California as members of the genus despite the very close similarity between the latter and the other northeastern Pacific fossil species.

The evidence presently at hand seems to suggest that *Swiftopecten swiftii*, and the northeastern Pacific species, *S. parmeleei, S. kindlei,* and possibly *S. etchegoini* evolved independently from a *Nanaochlamys*-like ancestor; whereas the other northeastern Pacific species such as the Santa Margarita form reported here, *S. wattsi* (ARNOLD) and *S. nutteri* (ARNOLD) evolved from the same stock as the Japanese species referred to *Chlamys cosibensis* (YOKOYAMA, 1911) by MASUDA.

It is not unlikely that more careful sampling of marine Middle and Late Miocene strata on the West Coast of North America may lead to the recovery of still older specimens.

Figure 1

Figure 2

Swiftopecten spec.

Univ. Calif. Mus. Paleo. no. 36639, locality D-1088. Santa Margarita Formation, Coalinga Quadrangle, T. 19 S., R. 15 E., Sec. 28: 3630 feet north, 500 feet east. From Oyster and Pecten-bearing bed outcropping on the hill slope about 120 feet north of Standard Oil Well 184. Fossil bed is about 40 feet stratigraphically below the base of the overlying Etchegoin Formation.

Figure 1: Dorsal view of valve. (x 2)

Figure 2: Dorso-lateral view of the same specimen showing two prominent constrictions on the ventral margin of the valve. (x 2)